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ABSTRACT

The primary purpose of this paper was to present the distinction between the actual contributions of Piaget regarding epistemological questions and the manner in which these contributions have been interpreted to provide a basis for current educational curriculum reform. It is the contention of the authors that the Piagetian theory concerning the nature of knowledge and how man acquires knowledge has little applicability to contemporary American education. The authors critically examine Piaget's position with respect to the nature of knowledge and how man comes to know. As part of this examination, the author investigates the Piagetian methodology utilized to ascertain the development of logical thought process. (Author/EB)

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THE APPLICABILITY OF PIAGET TO CONTEMPORARY CURRICULUM REFORM?*

by

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It is the primary purpose of this paper to present the distinction between our interpretation of the actual contributions of Jean Piaget regarding epistemological questions and the manner in which these contributions have been interpreted to provide a basis for current educational curriculum reform. It is the contention of the authors that the Piagetian Theory concerning the nature of knowledge and how Man acquires knowledge has little applicability to contemporary American education. However, and we must emphasize the however, if educational theorists could truly understand what Piaget is saying, it could cause a revolution in education. In regard to this statement, Furth (1969) has noted that "...revolutionary changes in the whole field of education and human relations seem to be a direct consequence of a deeper understanding of Piaget's theory. Who dares to guess how our primary education would change if teachers really took seriously Piaget's proposition that knowledge is an operation that constructs its objects?" (p. 7)

The work of Piaget has been dissected, digested and assimilated in this country to fit the mold of American education. The "American" Piaget has been created by curriculum reformists from various disciplines to provide a psychological rationale that seems to be relevant to

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contemporary educational trends. One might ask, relevant for whom and for what ends? We intend to draw the distinction between the actual contributions of Piaget in regard to specific epistemological questions and how these contributions have been reinterpreted to provide a basis for what appears to be relevant in the area of curriculum reform. The Piagetian Theory of intellectual development could provide a basis for a revolution in the relevancy of American education.

In any discussion of Piaget and the field of education, it is important to realize that he is an epistemologist and as such is pirmarily concerned with the nature and acquisition of knowledge. During his lifetime, Piaget has directed his efforts toward an elucidation of two basic questions. These are: 1) What is the nature of knowledge, and 2) How does Man come to know?

Traditionally, epistemology has existed within the confines of philosophy. As such, the questions related to the nature and acquisition of knowledge have historically been treated within the realm of speculation. Early in his life Piaget became dissatisfied with the speculative methods used by the philosopher. Commenting on speculation as a method to unravel epistemological questions, Piaget (1970) indicates:

> For many philosophers and epistemologists, epistemology is the study of knowledge as it exists at the present moment; it is the analysis of knowledge for its own sake and within its own framework without regard for its development. For these persons, tracing the development of ideas or the development of operations may be of interest to historians or to psychologists but is of no direct concern to epistemologists. (pp. 1-2)

As a biologist, Piaget turned to the method of verification to ascertain epistemological questions. In Insights and Illusions of Philosophy, Piaget (1971) provides us with a poignant description of

his own dilemma when faced with the methods of verification used by biologists and speculative reflection used by philosophers. He notes:

> Although speculative reflection is fertile and even a necessary heuristic introduction to all inquiry, it can only lead to the elaboration of hypothesis, as sweeping as you like, to be sure, but as long as one does not seek for verification by a group of facts established experimentally or by a deduction conforming to an exact algorithm (as in logic), the criterion of truth can only remain subjective... (p. 11)

The verification methods used by Piaget to investigate his two epistemological questions have been: 1) a historico-critical analysis of scientific notions; and 2) the study of children as an ontogenetic tool to ascertain the development of logical thought processes. The former method provides a historical prospective on how Man has come to view various ideas in science. Using the historico-critical method, Piaget has investigated within a historical context such notions as perception, identity, spatial relationships, time, and causality.

The later method of verification is used by Piaget to gain insight into the relationship of logical and rational organization of knowledge and the development of corresponding psychological processes. In the formative years of Genetic Epistemology, it became obvious to Piaget that one could not reconstruct the history of human thinking, i.e., a biogenesis of knowledge, therefore he turned to children and relied on ontogenesis in an attempt to understand the development of logical thought processes. Piaget (1970) notes "that it is with children that we have the best chance of studying the development of logical knowledge, mathematical knowledge, physical knowledge, and so forth." (pp. 13-14)

As a result of his historico-critical analysis, Piaget arrives at the conclusion that knowledge is a construction. Piaget (1970) indicates:

> Scientific knowledge is in perpetual evolution; it finds itself changed from one day to the next. As a result, we cannot say that on the one hand there is the history of knowledge, and on the other its current state today, as if its current state were somehow definitive or even stable. The current state of knowledge is a moment in history, changing just as rapidly as the state of knowledge in the past has changed and, in many instances, more rapidly. Scientific thought, then is not momentary; it is not a static instance; it is a process. More specifically, it is a process of continual construction and reorganization. (p.

A constructionalist viewpoint is in opposition to the traditional Western idea of the nature of knowledge. Constructionalism rejects both the epistemology of Nativism and that of a Tabula Rasa. Nativism, the position of Universal Knowledge, endows the organism with pre-formed categories of knowing that develop as a maturational activity and the Tabula Rasa, or blank slate, places the organism at the mercy of environmental influences. For Piaget, the organism constructs knowledge as a result of a dynamic interaction of the subject and the object. Piaget (1970b) indicates:

> To my way of thinking, knowing an object does not mean copying it -- it means acting upon it. It means constructing systems of transformations that can be carried out on or with this object. Knowing reality means constructing systems of transformations that can be carried out on or with the object.... The transformational structures on which knowledge consists are not copies of the transformations in reality; they are simply possible isomorphic models among which experience can enable us to choose. Knowledge, then, is a system of transformations that become progressively adequate. (p. 15)

Many American curriculum theorists are locked into a mindset of considering knowledge as being static and rely on a process of copy or imitation for the acquisition of knowledge. School in this sense becomes a teleological process where adults impose an accepted

construction and insist that the child accept the given construction. It is teleological in that the measure of acquired knowledge is based upon the child's ability to conform to predetermined constructions. In Piagetian terms, such thinking would be termed figurative; not operative. For Piaget (1970), figurative thinking is "an imitation of states taken as momentary and static" as opposed to operative thought which "deals not with states but with transformations from one state to another." (p. 14)

In addition to the question of the nature of knowledge, Piaget has concerned himself with how one acquires knowledge. As previously indicated, he turned to the use of children in an attempt to gain insight into the knowing process.

Piaget treated this question as any other biological problem. As such, he viewed the development of logical thought processes as a form of biological growth. Given a biological orientation for the development of intelligence implies an organization that interacts with the environment. For Piaget, the subject and the object are one. To separate the two would create a dualism that would relegate the knowing process to simply a copy of reality.

Inherent in biological systems is the notion of homeostasis or self-regulation. Piaget has postulated a theory of the knowing process based on an equilibration of a subject-object interaction. For Piaget, knowledge is a dynamic relationship. As a result of this interaction, the organism builds up knowledge that can be observed at various stages. Furth (1969) summarizes this position by stating:

> ...knowledge is in Piaget's theory never a state, whether subjective, representative, or objective. It is an activity. It can be viewed as a structuring of the subject in living interaction with the environment. In any case the laws of structuring are seen as intrinsically related to the self-regulations which are found at all levels of a developing organization. (pp. 20-21)

This second aspect to Piaget's theory is not consistent with the traditional Western epistemology of how Man acquires knowledge. The prevelant ideas concerning children's learning is through the use of language and symbols. The accepted belief in most Western schools is that fluent use of language and symbols is equated to knowledge. Contemporary curriculum reformers still rely on language as the primary mode of acquiring knowledge. Such an approach would be for Piaget simply a copy of reality. Unless the child has acted on the object and internalized his action he has not, in Piagetian sense, acquired knowledge.

Even the Piagetian stage theory of intellectual development has to be adapted to fit the traditional Western view. The stages have become for many educators an alternative to the I.Q. or a capacity for learning. The pressing question for such educators has become one of how can a given program accelerate the acquisition of a particular stage? Curricula which purports to be Piagetian have been used in the school, and some are primarily concerned with speeding up the intellectual growth of children. A careful examination of these particular programs will soon reveal that the overriding philosophy is one of attempting to teach operations, such as classification, seriation, or conservation, and not one of allowing the child to interact with objects and constructing his own knowledge.

Instead of viewing the stages as epistemological constructions of a child's view of reality, many American curriculum theorists are attempting to make the stages discrete units of a child's development that can be acquired in a rapid and efficient manner. Educators that are locked into this type of mindset are resorting back to a form of faculty psychology. Their main concern seems to be one of attempting to design curricula so as to develop the child's thought processes as quickly as possible. There appears in such programs an underlying pejorative belief that the attainment of formal operations is a primary consideration and that a lack of attainment is to be considered parallel to a lack of intelligence.

And so, what is being done as a result of this recent Piaget worship cult which is so intent on applying the findings of this genius? What has been gleaned from his writings and his interpreters? Stages, stages, stages!! What stage is Johnny at today? How can I push him ahead? One might not be surprised to find on report cards sometime in the future that Johnny has received an A in conservation of length and a C+ in class inclusion!

Piaget has never said that children can be put into stages and "labeled." He has observed children and has built a structure to explain his observation. This structure includes the development of a construct which includes stages based upon the child's ability to perform operations. Thus, the stages are named according to the ability or non-ability to perform these operations at various levels, i.e., pre-operational, concrete operational, and formal operational.

The child he is talking about is a hypothetical child -- a child constructed from his observations of hundreds of children. It might be analogous to the model of an atom constructed from data gathered through hundreds of experiments on matter. If observations of children provide contrary evidence, Piaget's "child" would have to be modified as has the "atom" theory through the years. And, we might assume, both will undergo exactly that modification for a long time to come.

To carry the analogy further, the atom is surrounded by a group or cloud of electrons whose position can only be estimated within the realms of statistical probability. The actual "atom" therefore, varies within the construct with any number of variations.

If we use this idea with children, it will soon be evident that children too, can only be viewed as varying within the construct, with an infinite number of permutations. It is reasonable then to assume that the various attempts to categorize and classify a child can only be viewed with a suspicious eye. Can we assume that to view it otherwise might result in the construction of another set of classifying tests?

If one looks through the literature and the myriad of new curricula which mention Piaget as a "co-author," it becomes evident that there are general inconsistencies within and between the programs. If one interprets Piaget as we have attempted to do, there are very obvious differences in the interpretations of his theories in curriculum. Take for example this quotation from the Science Curriculum Improvement Study (SCIS) Sourcebook: (SCIS 1969)

> The SCIS program starts with kindergarten and first grade children because children of these ages, left to their own devices, and already beginning to form many commonsense, naturalistic concepts that will have to be "unlearned" before a more sophisticated scientific view can be developed. There is some evidence to indicate that children's comprehension advances more rapidly in areas of scientific knowledge, which are largely learned in school, than it does in areas where learning takes place in a more naturalistic setting (Vygotsky, 1962, p. 106). (p. 25)

In a close reading of the section on Thought and Language by Vygotsky entitled Development of Scientific Concepts in Childhood, it becomes very clear that Vygotsky's point of view is somewhat different from Piaget's at least in the present notion of the relationship of language and the formation of logical thinking. Vygotsky states on page 108 of the same book that

> The child becomes conscious of his spontaneous concepts relatively late; the ability to define them in words, to operate with them at will, appears long after he has acquired the concepts. He has the concept (i.e., knows the object to which the concept refers), but is not conscious of his own act of thought. The development of a scientific concept, on the other hand, usually begins with its verbal definition and its use in non-spontaneous operations -- with working on the concept itself. It starts its life in the child's mind at the level that his spontaneous concepts reach only later. (Vygotsky, 1962)

This, it would appear to us, is what SCIS is saying since the idea of Invention lessons are based upon the idea that the child must, at least for a short time, accommodate "his thought to that of the teacher, as he imitates her classification." (SCIS Sourcebook) The philosophy further states, however, that this momentary accommodation is of little value unless the child can "discover" on his own, the implications of the invention on his own terms.

This philosophy is as much in the realm of a Vygotskyian philosophy as it is Piagetian. As we interpret Piaget, he is saying that intellectual operations appear to give rise to linguistic progress, and not

vice versa. This was affirmed by Mme. Sinclair's experiments in which she attempted to find out whether the linguistic level was influencing the operational level or whether the operational level was influencing the linguistic level. She began by teaching children to describe objects in the same terms that conservers use and to find out if this training had affected their operational level. It did not. Obviously, this is not a completely parallel situation since manipulation was not involved along with the verbal training in Mme. Sinclair's work. However, we raise the question as to whether the verbal beginning is conducive to better concept acquisition or whether it could be detrimental? Is there a danger that the well-meant "momentary" accommodation to the verbal structure of the teacher might last longer than anticipated? Might it not become a handy crutch to use because it is obviously so acceptable by adults in our highly verbal society. If so, the child might not master the verbal aspect of the concept in his work but be bound by it, limited by it and dependent upon it.

In other words, is <u>invention</u> necessary enough to concept development to take the risks which appear, at least to us, as evident. If, indeed, the child does not really need language to develop logical thought, as evidenced by Oleron's work in France and Furth's work in this country with deaf children, then why is it necessary to construct the verbal concept in Piaget's name? For it seems to be more and more evident as one works with children that adult concepts are somewhat puzzling to children and not very useful in many cases. Children should be allowed a maximum of activity of their own, directed by means of materials which permit their activities to be cognitively useful. In

the area of logico-mathematical structures, children have real understanding only of that which they invent themselves, and each time that we try to teach them something too quickly, we keep them from reinventing it themselves.

All of this is not meant to imply that the SCIS program is attempting to teach concepts too quickly or that it does not have beautiful and exciting activities in science. But need it be labeled as a Piagetian program?

In the program, there are three types of lessons: Exploratory, Invention, and Discovery. The exploratory lessons allow the children to manipulate their environment and to gain experience with objects and situations. The teacher is then asked to invent a concept such as interaction or system or habitat for the children. In the discovery lesson, the students attempt to find applications of activities to the concept. The exploration lessons seem quite Piagetian and the discovery lessons quite adaptable. It is merely the need for invention which seems non-Piagetian given our previous interpretation of what Piaget is saying.

The many changes being made in the name of Piagetian philosophy in hope of changing the educational system are totally inadequate. The programs are commendable as far as they have been able to go, but they are working toward the attainment of an almost hopeless goal. These attempts can be, at the same time, dangerous if those who adopt them assume that their use is the major step in changing the total educational system and bringing about the constructionalists' view of the education of children. The organization of the School is such that any attempt to

change one part of the mechanism triggers a self-styled homeostatic reaction resulting in the formation of institutional scar tissue and negating the intended change. What we really need is a change in our view of children and teachers across the board.

Piaget states in his book, Science of Education and the Psychology of the Child (Piaget, 1969), that:

> ...the period between 1935 and 1965 has seen the intuitive methods in a great number of new guises, all of which, I must repeat, are all the more disturbing in that their champions usually believe in all good faith that they satisfy all the most modern requirements of child psychology. To begin with one example, I myself have received a Belgian textbook for beginners in mathematics, with a preface by a well-known educator, in which both the author and the writer of the preface refer to my own works and even do me the honor of considering them as one of the sources of their inspiration, even though in fact the manipulation of elementary logico-mathematical operations has been entirely banished from their method and its place given to figurational institutions -- often, indeed essentially static ones. (p.73)

One wonders too, if certain programs designed to propel students through the "stages" by teaching and questioning are not malappropriating Piaget's ideas. In a conversation with the rerource person selling an early childhood program based on Piagetian theory, I was shocked by his statements about teaching operations. In one activity, children were asked to find patterns. If indeed the "best pattern" relationships were not found, the teacher was supposed to ask for a "better pattern," according to the resource person. I questioned the use of the word better and suggested the word other. Confusion followed. Is such a program concerned more with the figurative aspect of knowledge or the operative nature. If indeed, the resource person was in error, it is still not dangerous to attempt to teach operations.

Two major dangers exist, we believe: First,that the ideas of Piaget will be misinterpreted in order to fit a particular structure of pedagogical theory and will do more harm than good. Since it is labeled Piaget, it will be accepted without thought because of the Good Housekeeping Seal of Approval. Secondly, these ideas will be placed into the existing structure of our educational system where, even if correctly interpreted, it will be swallowed up as the system attempts to heal itself. What a waste of good theory! Let me ask you to again recall a statement made earlier in this paper which quotes Furth as asking what kinds of changes would occur if teachers really took seriously Piaget's proposition that knowledge is an operation that constructs its objects. It will certainly take a revolution to follow these dicta!

Piaget states in The Science of Education, that intelligence still consists in executing and coordinating actions, though in an interiorized and reflexive form and that these interiorized actions are nothing more than the logical or mathematical "operations" that are the motors of all judgment or reasoning. We question, then, those who attempt to "teach" operations. It would seem that a person who attempts to do so is attempting to teach intelligence. When one attempts to teach an operation it seems more likely that one is succeeding in teaching a child to make a copy of reality instead of organizing reality to fit his structures. It seems much more reasonable that schools should attempt to create the environment where children can deal with their environment in their own terms and make up knowledge that makes sense to them at the level they are capable of at that particular time in their development. (p. 29)

And what kind of school might this be? It might well be the school implied by Furth in Piaget for Teachers as "schools for thinking." Do schools like this exist? I am fairly certain that somewhere one can find a school or schools which approach this model. Certainly within the world there exist classrooms where this type of atmosphere pervades. One model, at least in its best forms, might be in the lately heralded British Infant School, the Integrated Day School or the Open Education School, etc. This model is not a consistent one in England. There are great numbers of variations on the theme and no two are exactly alike, nor should there be. Certain assumptions, however, concerning learning and knowledge have been compiled by Roland S. Barth in his unpublished dissertation, Open Education, at the Harvard Graduate School of Education in 1970. These assumptions have been tested by Barth and to date there has been no major disagreement on any assumption by an "open educator." These have also been published, in brief, in the October 1971 issue of the Phi Delta Kappan. Certain assumptions about knowledge appear below and seem to fit into the rationale about knowledge and knowing as we interpret Piaget:

> Assumption 2: Knowledge is a function of one's personal integration of experience and therefore does not fall into neatly separate categories or "disciplines."
>
> Assumption 3: The structure of knowledge is personal and idiosyncratic; it is a function of the synthesis of each individual's experience with the world.
>
> Assumption 4: Little or no knowledge exists which is essential for everyone to acquire
>
> Assumption 5: It is possible, even likely, that an individual may learn and possess knowledge of a phenomenon and yet be unable to display it publicly. Knowledge resides with the knower, not in its public expression. (p. 99)

Teaching is difficult because it asks a person who may be operating within a formal operational structure to prepare an environment for a child who may be functioning with pre-operational or concrete operational thinking. The arrangement of subjects is a product of mature formal operational thinking and has little meaning or importance in the mind of the child. The child assimilates knowledge better, creates his own knowledge without reference to such formalized boundaries. Should he be required to attempt to create his conceptions within these tight subject compartments? We think not. This can lead to a phenomenon so common today -- that of being unable to use that knowledge in a process of cross fertilization.

Piaget's philosophy and research suggests several very general principles which might have implications for education: (Richmond, 1970)

1. Intellectual development is a directed process, one of increasing stability of equilibrium and expansion of intellectual scope. The teacher who is aware of this, can in a sense, become the architect of that environment.
2. The child is the one who controls the rate of this development because he is the only one who performs the balancing process. (p. 92)

Developmental situations are derived in schools by teachers. The children either consciously or unconsciously organize their own adaptation. Piaget (1966) states in The Psychology of Intelligence that "...without interchange of thought and co-operation with others the individual would never come to group his operations into a coherent whole...". (p. 163) This seems to imply a school where interaction is a must.

In closing, we quote from Piaget's comments on Vygotsky's critical remarks concerning Language and Thought of the Child: (Piaget, 1962)

> In some cases, what is transmitted by instruction is well assimilated by the child because it represents in fact an extension of some spontaneous constructions of his own. In such cases, his development is accelerated. But in other cases, the gifts of instruction are presented too soon or too late, or in a manner that precludes assimilation because it does not fit in with the child's spontaneous constructions. Then the child's development is impeded, or even into barrenness, as so often happens in the teaching of the exact sciences. Therefore I do not believe, as Vygotsky seems to do, that new concepts, even at school level, are always acquired through adult didactic intervention. This may occur but there is a much more productive form of instruction: the so-called "active schools" endeavour to create situations that, while not 'spontaneous' in themselves, evoke spontaneous elaboration on the part of the child, if one manages both to spark his interest and to present the problem in such a way that it corresponds to the structures he had already formed himself. (p. 11)

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